



CLEAN VERSION OF AMENDED SPECIFICATION PARAGRAPHS

HIGH OUTPUT HIGH EFFICIENCY LOW VOLTAGE CHARGE PUMP

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The paragraph beginning on page 2, line 29:

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An illustrative embodiment includes a charge pump circuit. The charge pump circuit includes an oscillator to generate an oscillating signal. The charge pump circuit further includes a primary phase generator, which receives the oscillating signal and generates first and second phase signals that are non-overlapping and crossing around their high points. The primary phase generator further generates third and fourth phase signals that are non-overlapping and crossing around their low points. The charge pump circuit further includes a secondary phase generator, which receives the first and second phase signals from the primary phase generator, and generates fifth and sixth phase signals that are similar to the first and second phase signals and having a predetermined delay from the first and second phase signals. The charge circuit further includes first and second pre-boot precharge capacitors, which receive the third and fourth phase signals from the primary phase generator. The charge pump circuit further includes first and second pre-boot capacitors, which receive the first and second phase signals from the primary phase generator, and is further precharged by the first and second pre-boot precharge capacitors during a first phase and a second phase respectively to a first pre-determined level. The charge pump further includes first and second main pump precharge capacitors, which receive the first and second phase signals during the first and second phases. The charge pump circuit further includes first and second main pump capacitors for outputting the charge. The first and second main pump precharge capacitors precharge the first and second main pump capacitors to a second pre-determined level respectively. According to one embodiment, the charge pump is generally prebooting one of the main pump capacitors to a predetermined boot level, while it is outputting the charge from the other main pump capacitor when it receives the one of the phase signals from the secondary phase generator which boots the main pump cap to a third predetermined level. As a result, the pre-boot time is hidden during a charge out. This enables the charge pump to run at a faster cycle time which can result in a higher output. This also enables the charge pump to produce more charge for a given size of a capacitor. Other aspects of the invention will be apparent on reading the following detailed description of the invention and viewing the drawings that form a part thereof.

The paragraph beginning on page 5, line 16 is amended as follows:

C2
The transistors described herein include transistors from bipolar-junction technology (BJT), field effect technology (FET), or complementary metal-oxide-semiconductor (CMOS). A metal-oxide-semiconductor (MOS) transistor includes a gate, a first node (drain) and a second node (source). Since a MOS transistor is typically a symmetrical device, the true designation of "source" and "drain" is only possible once voltage is impressed on the terminals. The designations of source and drain herein should be interpreted, therefore, in the broadest sense.

The paragraph beginning on page 6, line 22 is amended as follows:

C3
The terms "pre-boot capacitors" and "pre-boosting stages" described herein include any devices capable of providing charges to maintain a predetermined level of charges in an energy storing device while a system that includes the energy-storing device is turned off. Pre-boot capacitors are used first to boot the first and second main pump capacitors to a predetermined boot level. While the first main capacitor is outputting a charge in the first phase, the pre-boot is booting the second main capacitor to a predetermined boot level in the second phase and vice-versa. This process hides the pre-boot time and enables the charge pump circuit to run at a faster cycle time resulting in outputting more charge for a given size of a capacitor.